

1.) Solve the equation $2\cos x = \sin 2x$, for $0 \leq x \leq \pi$.

(Total 7 marks)

2.) The straight line with equation $y = \frac{3}{4}x$ makes an acute angle with the x -axis.

(a) Write down the value of $\tan \theta$.

(1)

(b) Find the value of

(i) $\sin 2\theta$;

(ii) $\cos 2\theta$.

(6)

(Total 7 marks)

3.) (a) Show that $4 - \cos^2 \theta + 5 \sin^2 \theta = 2 \sin^2 \theta + 5 \sin^2 \theta + 3$.

(2)

(b) **Hence**, solve the equation $4 - \cos^2 \theta + 5 \sin^2 \theta = 0$ for $0 \leq \theta \leq \pi$.

(5)

(Total 7 marks)

4.) Solve $\cos 2x - 3 \cos x - 3 - \cos^2 x = \sin^2 x$, for $0 \leq x \leq \pi$.

(Total 7 marks)

5.) Let $f(x) = \sin^3 x + \cos^3 x \tan x$, $-\frac{\pi}{2} < x < \frac{\pi}{2}$.

(a) Show that $f(x) = \sin x$.

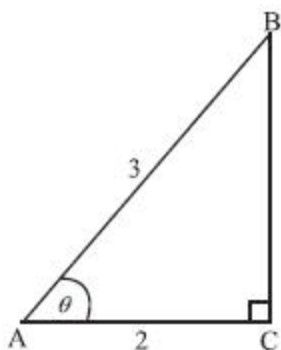
(2)

(b) Let $\sin x = \frac{2}{3}$. Show that $f(2x) = -\frac{4\sqrt{5}}{9}$.

(5)

(Total 7 marks)

- 6.) The following diagram shows a triangle ABC, where \hat{ACB} is 90° , $AB = 3$, $AC = 2$ and \hat{BAC} is q .



- (a) Show that $\sin q = \frac{\sqrt{5}}{3}$.
- (b) Show that $\sin 2q = \frac{4\sqrt{5}}{9}$.
- (c) Find the **exact** value of $\cos 2q$.

(Total 6 marks)

- 7.) (a) Consider the equation $4x^2 + kx + 1 = 0$. For what values of k does this equation have two **equal** roots?

(3)

Let f be the function $f(q) = 2 \cos 2q + 4 \cos q + 3$, for $-360^\circ \leq q \leq 360^\circ$.

- (b) Show that this function may be written as $f(q) = 4 \cos^2 q + 4 \cos q + 1$.

(1)

- (c) Consider the equation $f(q) = 0$, for $-360^\circ \leq q \leq 360^\circ$.

(i) How many distinct values of $\cos q$ satisfy this equation?

(ii) Find all values of q which satisfy this equation.

(5)

- (d) Given that $f(q) = c$ is satisfied by only three values of q , find the value of c .

(2)

(Total 11 marks)

- 8.) Let $f(x) = a(x - 4)^2 + 8$.

- (a) Write down the coordinates of the vertex of the curve of f .
- (b) Given that $f(7) = -10$, find the value of a .
- (c) Hence find the y-intercept of the curve of f .

(Total 6 marks)

9.) The function f is defined by $f: x \rightarrow 30 \sin 3x \cos 3x, 0 \leq x \leq \frac{\pi}{3}$.

- (a) Write down an expression for $f(x)$ in the form $a \sin 6x$, where a is an integer.
- (b) Solve $f(x) = 0$, giving your answers in terms of π .

(Total 6 marks)

10.) Solve the equation $2 \cos^2 x = \sin 2x$ for $0 \leq x \leq \pi$, giving your answers in terms of π .

Working:

Answer:

(Total 6 marks)

11.) Given that $\sin x = \frac{1}{3}$, where x is an acute angle, find the **exact** value of

- (a) $\cos x$;
- (b) $\cos 2x$.

Working:

Answers:

(a)

(b)

(Total 6 marks)

12.) Consider the trigonometric equation $2 \sin^2 x = 1 + \cos x$.

- (a) Write this equation in the form $f(x) = 0$, where $f(x) = a \cos^2 x + b \cos x + c$, and $a, b, c \in \mathbb{Z}$.
- (b) Factorize $f(x)$.
- (c) Solve $f(x) = 0$ for $0^\circ \leq x \leq 360^\circ$.

<div>Working:</div>	<div>Answers:</div> <div>(a)</div> <div>(b)</div> <div>(c)</div>
---------------------	--

(Total 6 marks)

- 13.) (a) Write the expression $3 \sin^2 x + 4 \cos x$ in the form $a \cos^2 x + b \cos x + c$.
- (b) Hence or otherwise, solve the equation

$3 \sin^2 x + 4 \cos x - 4 = 0, \quad 0^\circ \leq x \leq 90^\circ.$

<div>Working:</div>	<div>Answers:</div> <div>(a)</div> <div>(b)</div>
---------------------	---

(Total 4 marks)

14.) (a) Express $2 \cos^2 x + \sin x$ in terms of $\sin x$ only.

(b) Solve the equation $2 \cos^2 x + \sin x = 2$ for x in the interval $0 \leq x \leq \pi$, giving your answers exactly.

Working:

Answers:

(a)

(b)

(Total 4 marks)

15.) If A is an obtuse angle in a triangle and $\sin A = \frac{5}{13}$, calculate the exact value of $\sin 2A$.

Working:

Answer:

.....

(Total 4 marks)